SEQUENCE LISTING

<110> Rebecca E. Cahoon
      Steven Gutteridge
      Leslie T. Harvell
      J. Antoni Rafalski
      Yong Tao
      Zude Weng

<120> Polynucleotides Encoding Aminolevulinic Acid Biosynthetic Enzymes

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Val Ile Gly Leu Ser Val His Thr Ala Pro Val Glu Met Xaa Xaa Lys
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Leu Ala Val Ala Glu Glu Leu Trp Pro Arg Ala Ile Gln Glu Leu
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aaacttcatt gttcgcaaaa gaacacgcag aggcactccc cctgtctct gatactatgg  1140
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         35                  40                  45

Val Glu Ala Gln Ala Gln Ala Val Ala Lys Ala Ala Ser Val Ala Ala
     50                  55                  60

Leu Glu Gln Phe Lys Ile Ser Ala Asp Arg Tyr Met Lys Glu Arg Ser
 65                  70                  75                  80

Thr Ile Ala Val Ile Gly Leu Ser Val His Thr Ala Pro Val Glu Met
                 85                  90                  95

Arg Glu Lys Leu Ala Val Ala Glu Glu Leu Trp Pro Arg Ala Ile Gln
            100                 105                 110

Glu Leu Thr Ser Leu Asn His Ile Glu Glu Ala Ala Val Leu Ser Thr
            115                 120                 125

Cys Asn Arg Met Glu Ile Tyr Val Val Ala Leu Ser Trp Asn Arg Gly
        130                 135                 140

Ile Arg Glu Val Val Asp Trp Met Ser Lys Lys Ser Gly Ile Pro Ala
145                 150                 155                 160

Ser Glu Leu Arg Glu His Leu Phe Ile Leu Arg Ser Ser Asp Ala Thr
                165                 170                 175

Arg His Leu Phe Glu Val Ser Ala Gly Leu Asp Ser Leu Val Leu Gly
            180                 185                 190

Glu Gly Gln Ile Leu Ala Gln Val Lys Gln Val Val Arg Ser Gly Gln
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Asn Ser Gly Gly Leu Gly Lys Asn Ile Asp Arg Met Phe Lys Asp Ala
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Ile Thr Ala Gly Lys Arg Val Arg Ser Glu Thr Asn Ile Ser Ser Gly
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Pro Lys Ser Glu Ala Leu Ser Ala Arg Met Leu Leu Ile Gly Ala Gly
              260                265                270

Lys Met Gly Lys Leu Val Ile Lys His Leu Val Ala Lys Gly Cys Lys
          275                280                285

Lys Val Val Val Val Asn Arg Ser Val Glu Arg Val Asp Ala Ile Arg
      290                295                300

Glu Glu Met Lys Asp Ile Glu Ile Val Tyr Arg Pro Leu Ser Asp Met
305               310                315                320

Tyr Gln Ala Ala Ala Glu Ala Asp Val Val Phe Thr Ser Thr Ala Ser
                  325                330                335

Glu Thr Ser Leu Phe Ala Lys Glu His Ala Glu Ala Leu Pro Pro Val
              340                345                350

Ser Asp Thr Met Gly Gly Val Arg Leu Phe Val Asp Ile Ser Val Pro
          355                360                365

Arg Asn Val Ser Ala Cys Val Ser Glu Val Gly Ala Ala Arg Val Tyr
      370                375                380

Asn Val Asp Asp Leu Lys Glu Val Val Glu Ala Asn Lys Glu Asp Arg
385               390                395                400

Leu Arg Lys Ala Met Glu Ala Gln Thr Ile Ile Thr Glu Glu Leu Arg
                  405                410                415

Arg Phe Glu Ala Trp Arg Asp Ser Leu Glu Thr Val Pro Thr Ile Lys
              420                425                430

Lys Leu Arg Ser Tyr Ala Asp Arg Ile Arg Ala Ser Glu Leu Glu Lys
          435                440                445

Cys Leu Gln Lys Val Gly Glu Asp Ala Leu Thr Lys Lys Met Arg Arg
      450                455                460

Ala Ile Glu Glu Leu Ser Thr Gly Ile Val Asn Lys Leu Leu His Gly
465               470                475                480

Pro Leu Gln His Leu Arg Cys Asp Gly Ser Asp Ser Arg Thr Leu Asp
                  485                490                495

Glu Thr Leu Glu Asn Met His Ala Leu Asn Arg Met Phe Ser Leu Asp
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tacacactgc accagtggag atgcgtgaga aacttgctgt tgcagaggaa ctatggcccc 180
gtgctatctc agaactcacc agtctgaatc atattgaaga ggttgctgtc cttaagtacc 240

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          gntnccttga nattgatnca anagcaatcn gtttgaggna ccnccgggct nnaccttggt 420
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                      20                  25                  30

          Val Ile Gly Leu Ser Val His Thr Ala Pro Val Glu Met Arg Glu Lys
                  35                  40                  45

          Leu Ala Val Ala Glu Glu Leu Trp Pro Arg Ala Ile Ser Glu Leu Thr
              50                  55                  60

          Ser Leu Asn His Ile Glu Glu Val Ala Val Leu Xaa Leu Ser Thr Cys
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          Asn Arg Met Glu Ile Tyr Val
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          gtccccagaa atgtcagcgc ctgtgtgtct gaagttggcc atgcgcgagt atacaacgtc 1020
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             20                  25                  30

Val Ile Gly Leu Ser Val His Thr Ala Pro Val Glu Met Arg Glu Lys
         35                  40                  45

Leu Ala Val Ala Glu Glu Leu Trp Pro Arg Ala Ile Glu Ser Glu Leu Thr
     50                  55                  60

Ser Leu Asn His Ile Glu Glu Ala Ala Val Leu Ser Thr Cys Asn Arg
 65                  70                  75                  80

Met Glu Ile Tyr Val Val Ala Leu Ser Trp Asn Arg Gly Ile Arg Glu
                 85                  90                  95

Val Val Asp Trp Met Ser Lys Lys Ser Gly Ile Pro Ala Ser Glu Leu
                100                 105                 110

Arg Glu His Leu Phe Met Leu Arg Asp Ser Asp Ala Thr Arg His Leu
         115                 120                 125

Phe Glu Val Ser Ala Gly Leu Asp Ser Leu Val Leu Gly Glu Gly Gln
     130                 135                 140

Ile Leu Ala Gln Val Lys Gln Val Val Arg Ser Gly Gln Asn Ser Gly
145                 150                 155                 160

Gly Leu Gly Lys Asn Ile Asp Arg Met Phe Lys Asp Ala Ile Thr Ala
                165                 170                 175

Gly Lys Arg Val Arg Cys Glu Thr Asn Ile Ser Ser Gly Ala Val Ser
             180                 185                 190

Val Ser Ser Ala Ala Val Glu Leu Ala Leu Met Lys Leu Pro Lys Ser
         195                 200                 205

Glu Cys Leu Ser Ala Arg Met Leu Leu Ile Gly Ala Gly Lys Met Gly
     210                 215                 220
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Lys Leu Val Val Lys His Leu Ile Ala Lys Gly Cys Lys Lys Val Val
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Val Val Asn Arg Ser Val Glu Arg Val Asp Ala Ile Arg Glu Glu Met
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Lys Asp Ile Glu Ile Val Tyr Arg Pro Leu Thr Glu Met Tyr Glu Ala
            260                 265                 270

Ala Ala Glu Ala Asp Val Val Phe Thr Ser Thr Ala Ser Glu Thr Pro
        275                 280                 285

Leu Phe Thr Lys Glu His Ala Glu Ala Leu Pro Ala Ile Ser Asp Ala
        290                 295                 300

Met Gly Gly Val Arg Leu Phe Val Asp Ile Ser Val Pro Arg Asn Val
305                 310                 315                 320

Ser Ala Cys Val Ser Glu Val Gly His Ala Arg Val Tyr Asn Val Asp
                325                 330                 335

Asp Leu Lys Glu Val Val Glu Ala Asn Lys Glu Asp Arg Leu Arg Lys
            340                 345                 350

Ala Met Glu Ala Gln Thr Ile Ile Thr Gln Glu Leu Lys Arg Phe Glu
        355                 360                 365

Ala Trp Arg Asp Ser Leu Glu Thr Val Pro Thr Ile Lys Lys Leu Arg
370                 375                 380

Ser Tyr Ala Asp Arg Ile Arg Ala Ser Glu Leu Glu Lys Cys Leu Gln
385                 390                 395                 400

Lys Ile Gly Glu Asp Ala Leu Thr Lys Lys Met Arg Arg Ser Ile Glu
                405                 410                 415

Glu Leu Ser Thr Gly Ile Val Asn Lys Leu Leu His Gly Pro Leu Gln
            420                 425                 430

His Leu Arg Cys Asp Gly Ser Asp Ser Arg Thr Leu Asp Glu Thr Leu
        435                 440                 445

Glu Asn Met His Ala Leu Asn Arg Met Phe Ser Leu Asp Thr Glu Lys
    450                 455                 460

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accgccttca aggtcatcat tcaccacttt tcccggncaa aacagaagaa ccctcattca 240
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Leu Lys Cys Ser Ser Ser Ser Ser Ser
            20                  25


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<213> Glycine max

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caatcagact gatttatttt ctcctttaga ataagagaa acatcctcac ctttttagtat 1800
taatcatcct gcaatattta gttgctcagt tgaaacagct gaagtcctcc atgctgcgtc 1860
tgcttggcct aactcgtttg cgttttttgg gtcatggctt ttcactgtgt tcttccgcat 1920
ccatttgtct ttgtattata caaaatgaag tgttttggtg agcttcgtat ttacatcaaa 1980
taatattgtt ataagattgt ccccgtatcg ggaaaaaaaa aaaaaaaaaa aaaaaaaaaa 2040
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<210> 12
<211> 536
<212> PRT
<213> Glycine max

<400> 12
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1   5   10   15

Leu Lys Cys Ser Ser Ser Ser Ser Ser Pro Pro Pro Ser Arg Ser Ser
        20   25   30

Phe Thr Thr Phe Pro Gly Gln Asn Arg Arg Thr Leu Ile Gln Arg Gly
        35   40   45

Val Ile Arg Cys Asp Ala Gln Pro Ser Asp Ala Ser Ser Val Ala Pro
    50   55   60

Asn Asn Ala Thr Ala Leu Ser Ala Leu Glu Gln Leu Lys Thr Ser Ala
65   70   75   80

Ala Asp Arg Tyr Thr Lys Glu Arg Ser Ser Ile Ile Ala Ile Gly Leu
            85   90   95

Ser Val His Thr Ala Pro Val Glu Met Arg Glu Lys Leu Ala Ile Pro
            100   105   110

Glu Ala Glu Trp Pro Arg Ala Ile Ala Glu Leu Cys Ser Leu Asn His
        115   120   125

Ile Glu Glu Ala Ala Val Leu Ser Thr Cys Asn Arg Met Glu Ile Tyr
    130   135   140

Val Leu Ala Leu Ser Gln His Arg Gly Val Lys Glu Val Met Glu Trp
145   150   155   160

Met Ser Lys Thr Ser Ser Val Pro Val Ser Glu Leu Ser Gln His Arg
            165   170   175

Phe Leu Leu Tyr Asn Asn Asp Ala Thr Gln His Leu Phe Glu Val Ser
            180   185   190

Ala Gly Leu Asp Ser Leu Val Leu Gly Glu Gly Gln Ile Leu Ser Gln
        195   200   205

Val Lys Gln Val Val Lys Val Gly Gln Gly Val Asn Gly Phe Gly Arg
    210   215   220

Asn Ile Ser Gly Leu Phe Lys His Ala Ile Thr Val Gly Lys Arg Val
225   230   235   240

Arg Thr Glu Thr Asn Ile Ala Ser Gly Ala Val Ser Val Ser Ser Ala
            245   250   255

Ala Val Glu Leu Ala Tyr Met Lys Leu Pro Glu Ala Ser His Asp Asn
            260   265   270

Ala Arg Met Leu Val Ile Gly Ala Gly Lys Met Gly Lys Leu Val Ile
        275   280   285

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Lys His Leu Val Ala Lys Gly Cys Lys Lys Met Val Val Asn Arg
    290                 295             300

Thr Glu Glu Arg Val Ala Ala Ile Arg Glu Glu Leu Lys Asp Ile Glu
305                 310             315                 320

Ile Ile Tyr Lys Pro Leu Ser Glu Met Leu Thr Cys Ala Gly Glu Ala
            325             330                 335

Asp Leu Val Phe Thr Ser Thr Ala Ser Glu Asn Pro Leu Phe Leu Lys
            340             345             350

Glu His Val Lys Asp Leu Pro Pro Ala Ser Gln Glu Val Gly Gly Arg
        355                 360             365

Arg Phe Phe Ile Asp Ile Ser Val Pro Arg Asn Val Gly Ser Cys Val
    370             375             380

Ser Asp Leu Glu Ser Val Arg Val Tyr Asn Val Asp Asp Leu Lys Glu
385             390                 395                 400

Val Val Ala Ala Asn Lys Glu Asp Arg Leu Arg Lys Ala Met Glu Ala
            405             410             415

Gln Ala Ile Ile Ala Glu Glu Ser Lys Gln Phe Glu Ala Trp Arg Asp
        420             425             430

Ser Leu Glu Thr Val Pro Thr Ile Lys Lys Leu Arg Ala Tyr Ala Glu
    435             440             445

Arg Ile Arg Leu Ala Glu Leu Glu Lys Cys Leu Gly Lys Met Gly Asp
    450             455             460

Asp Ile Pro Lys Lys Thr Arg Arg Ala Val Asp Asp Leu Ser Arg Gly
465             470             475                 480

Ile Val Asn Lys Leu Leu His Gly Pro Met Gln His Leu Arg Cys Asp
            485             490                 495

Gly Asn Asp Ser Arg Thr Leu Ser Glu Thr Leu Glu Asn Met Asn Ala
            500             505             510

Leu Asn Arg Met Phe Asn Leu Glu Thr Glu Ile Ser Val Leu Glu Glu
        515             520             525

Lys Ile Arg Ala Lys Val Glu Gln
    530             535


<210> 13
<211> 507
<212> DNA
<213> Glycine max

<220>
<221> unsure
<222> (496)
<223> n=a,c,g or t

<220>
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acctcctcct ccctcttctc ctccgcccga ttccgccact ccctccgccc accgccttct   180
caactcttct tcccacgcgc gcgctttttcc gtcaacgcca cgtgtcccctt cttctccgat   240
aacaacaatt ccctcccca aaacgtcgtc gcttccaaac cctccccctct cgagttgtctc   300
aaagcttcct ccgccgacag atatacgaag gaaaagagtt gcattatttg cataggggctg   360
aacattcaca ctgctcccgt tgagatgcgt gagaagcttg caattccaag aatcccattg   420
ggctcaggct attaaggacc tttgcgcttt gaaccatatc gaagaagcgc gggtctaaga   480
agtggtaacg caaggngatn tatgttg   507

<210> 14
<211> 46
<212> PRT
<213> Glycine max

<400> 14
Ala Ser Lys Pro Ser Pro Leu Glu Leu Leu Lys Ala Ser Ser Ala Asp
 1   5   10   15

Arg Tyr Thr Lys Glu Lys Ser Cys Ile Ile Cys Ile Gly Leu Asn Ile
            20   25   30

His Thr Ala Pro Val Glu Met Arg Glu Lys Leu Ala Ile Pro
        35   40   45

<210> 15
<211> 1983
<212> DNA
<213> Glycine max

<400> 15
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cgccaccacc tcctcctccc tcttctcctc cgcccgattc cgccactccc tccgcccacc   180
gccttctcaa ctcttcttcc cacgcgcgcg cttttccgtc aacgccacgt gtcccttctt   240
ctccgataac aacaattccc ttccccaaaa cgtcgtcgtc tccaaaccct ccctctcga   300
gttgctcaaa gcttcctccg ccgacagata tacgaaggaa aagagttgca ttatttgcat   360
agggctgaac attcacactg ctcccgttga gatgcgtgag aagcttgcaa ttccagaatc   420
ccattgggct caggctatta aggacctttg cgctttgaac catatcgaag aagccgcggt   480
tctcagcacg tgtaaccgca tggagatcta tgttgtggct ctttcccagc accgtggtgt   540
taaggaagtt actgattgga tgtctaaggt gagcgggatt tcaatacctg agctttgtga   600
gcaccaagtt ttgctgtata acgcggatgt cacgcagcat ctctttgaag tggcggcagg   660
gcttgactca cttgttcttg gggaaggtca aattcttgct caggtgaagc aggttgtgaa   720
agctggacag ggagtgcctg gttttgataa gaaaattagt ggtttgttca agcaggcgat   780
ctcggttggg aagcgggtta gaactgagac taacatttcg tctggatcgg tttctgtcag   840
ctcggctgat gtggagctcg cactgatgaa gcttccggat tcctcctttg ctgattctgg   900
agtgttggtg gttggtgcag ggaagatggg gaagcttgta attaagcatt tggctgccaa   960
agggtgcaga agaatggttg ttgttaacag gactgaagag aaagttaatg ccattcggaa 1020
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tgtgcaagta cttcctctgg ttaatcatgg gagaaggcgg cttttttgtg atatatctat 1200
tcctaggaat gtggaaccgg tgtgtctcaga tctggagact gcacttgtgt acaatgtgga 1260
tgatctgaag gaagttgttg cagctaacaa ggaggacagg cttcagaaag ttgctgaag 1320
ccggggaatt atactagagg agttgaataa attcgaagct tggaaagact ctctggaaac 1380
tgttcctact attaagaagt ttagagctta tgttgagagg ataagagcct ctgagatgga 1440

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tgggaaaaat gatagtagtc tgagtgaggt acttgagaat atgcgtgccc ttaacagaat 1620
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ggttcagaag tagattcttc ttcaattggt ttagttttat ttgattcttg tggggggctgc 1740
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caattatttt taacattatg cagaagtaat tggacatcga tagtccaatt gaattcaaca 1860
tgtatttttc tcaatgagcc tgatatagat cagttgtaaa ttcatgatcc tcatgacaac 1920
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<210> 16
<211> 467
<212> PRT
<213> Glycine max

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 1               5                  10                  15

Glu Lys Ser Cys Ile Ile Cys Ile Gly Leu Asn Ile His Thr Ala Pro
             20                  25                  30

Val Glu Met Arg Glu Lys Leu Ala Ile Pro Glu Ser His Trp Ala Gln
         35                  40                  45

Ala Ile Lys Asp Leu Cys Ala Leu Asn His Ile Glu Glu Ala Ala Val
     50                  55                  60

Leu Ser Thr Cys Asn Arg Met Glu Ile Tyr Val Val Ala Leu Ser Gln
 65                  70                  75                  80

His Arg Gly Val Lys Glu Val Thr Asp Trp Met Ser Lys Val Ser Gly
                 85                  90                  95

Ile Ser Ile Pro Glu Leu Cys Glu His Gln Val Leu Leu Tyr Asn Ala
             100                 105                 110

Asp Val Thr Gln His Leu Phe Glu Val Ala Ala Gly Leu Asp Ser Leu
         115                 120                 125

Val Leu Gly Glu Gly Gln Ile Leu Ala Gln Val Lys Gln Val Val Lys
     130                 135                 140

Ala Gly Gln Gly Val Pro Gly Phe Asp Lys Lys Ile Ser Gly Leu Phe
145                 150                 155                 160

Lys Gln Ala Ile Ser Val Gly Lys Arg Val Arg Thr Glu Thr Asn Ile
                 165                 170                 175

Ser Ser Gly Ser Val Ser Val Ser Ser Ala Ala Val Glu Leu Ala Leu
             180                 185                 190

Met Lys Leu Pro Asp Ser Ser Phe Ala Asp Ser Gly Val Leu Val Val
         195                 200                 205

Gly Ala Gly Lys Met Gly Lys Leu Val Ile Lys His Leu Ala Ala Lys
     210                 215                 220

Gly Cys Arg Arg Met Val Val Val Asn Arg Thr Glu Glu Lys Val Asn
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Ala Ile Arg Lys Glu Leu Lys Asp Val Glu Ile Val Phe Arg Pro Phe
                  245   250   255

Ser Asp Met Leu Ala Cys Ala Ala Glu Ala Asp Val Ile Phe Thr Ser
              260   265   270

Thr Ala Ser Glu Ser Pro Leu Phe Ser Lys Gln Asn Val Gln Met Leu
          275   280   285

Pro Leu Val Asn His Gly Arg Arg Arg Leu Phe Val Asp Ile Ser Ile
      290   295   300

Pro Arg Asn Val Glu Pro Gly Val Ser Asp Leu Glu Thr Ala Leu Val
305   310   315   320

Tyr Asn Val Asp Asp Leu Lys Glu Val Val Ala Ala Asn Lys Glu Asp
              325   330   335

Arg Leu Gln Lys Ala Glu Glu Ala Arg Gly Ile Ile Leu Glu Glu Leu
              340   345   350

Asn Lys Phe Glu Ala Trp Lys Asp Ser Leu Glu Thr Val Pro Thr Ile
          355   360   365

Lys Lys Phe Arg Ala Tyr Val Glu Arg Ile Arg Ala Ser Glu Met Glu
      370   375   380

Lys Cys Leu Ser Lys Met Gly Pro Asp Val Ser Lys Gln Gln Lys Asp
385   390   395   400

Ala Ile Tyr Ala Leu Ser Met Gly Ile Val Asn Lys Leu Leu His Gly
              405   410   415

Pro Met Gln His Leu Arg Cys Asp Gly Lys Asn Asp Ser Ser Leu Ser
              420   425   430

Glu Val Leu Glu Asn Met Arg Ala Leu Asn Arg Met Tyr Asp Leu Glu
          435   440   445

Thr Glu Ile Ser Leu Ile Glu Glu Lys Ile Arg Val Lys Met Glu Arg
      450   455   460

Val Gln Lys
465

<210> 17
<211> 468
<212> DNA
<213> Glycine max

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<223> n=a,c,g or t

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<222> (454)..(455)
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ttctccggtg cacaaattgg aggctctatt gctcaaatgt ncttcctcct cttcctcacc   120
accgccttca aggtcatcat tcaccacttt tcccggccaa aacagaagaa ccctcattca   180
gagaggggtt attcgctgcg acgctcagcc ctctgatgca tcatctgttg cnccaaataa   240
tgccaccgct ctctccgctc ttgagcagct caagacttct gcagctgata gatatacnaa   300
tgaaagcagc agnattaccg ccattggggt cagtgtgcaa ctgcactgng aaatccgtgn   360
aaacttgcaa tcaggannag aatngccnga nntattnaan agtgtgngtn tgatatttaa   420
gannnnnngt nnantactgn natcgntgtg nttnngtctg cctgtaca   468

<210> 18
<211> 26
<212> PRT
<213> Glycine max

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<222> (8)
<223> Xaa = ANY AMINO ACID

<220>
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<222> (21)
<223> Xaa = ANY AMINO ACID

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Met Ala Val Ser Thr Thr Phe Xaa Pro Val His Lys Leu Glu Ala Leu
 1   5   10   15

Leu Leu Lys Cys Xaa Ser Ser Ser Ser Ser
            20   25

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<210> 19
<211> 1480
<212> DNA
<213> Triticum aestivum

<400> 19
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catgcgtgaa aaacttgctg ttgcagagga actatggccc cgtgctattt cagaactcac   120
cagtctgaat catatcgaag aggctgctgt tctgatacc tgcaacagaa tggaaatata   180
tgtggtggct ttatcgtgga accgtggtat tagagaagta gtagactgga tgtcaaagaa   240
aagtggaatc cctgcttccg agctgaggga gcatctcttt atgttgcgtg acagtgatgc   300
cacacgccat ctgtttgagg tatccgccgg gcttgactct ttggttcttg gagaaggaca   360
aatccttgct caagttaaac aagttgtcag aaatgggcaa aacagtggag gcttgggaaa   420
gaacattgat aggatgttca aggatgcaat cacagctgga aagcgtgtcc gctgtgaaac   480
caacatatca gctggtgctg tgtctgtcag ttcagctgca gttgaattgg ccatgatgaa   540
gcttccaaag tctgaatgct tgtcagctag gatgcttttg attggtgctg gcaaaatggg   600
aaaattggtt gtcaaacatt tgattgccaa aggatgcaag aaggttgttg tggtgaaccg   660
ttctgtggaa agggtggatg ccattcgcca agagatgaaa gatattgaga ttgtgtacag   720
gcctcttaca gagatgtatg aagccgctgc tgaagctgat gtcgtgttca caagcaccgc   780
atctgaatcc ttattattca cgaaggagca tgcagaggcg cttcctccta tttctcttgc   840
tgtgggtggt gttcggcttt tcgtcgacat atctgtcccg aggaatgtcg gtgcctgtgt   900
atctgaggtg gagcatgcac gggtatacaa tgtcgacgac ttgaaagagg tggtggaagc   960
caataaggaa gaccgtgtga ggaaagcaat ggaggcccaa acaatcatta cccaagaact  1020
gaaacggttc gaggcatgga gggactcact ggagacggtt ccgaccatca aaaagctgag  1080
gtcgtacgcc gacaggatca gggcatccga gctcgagaag tgtctgcaga agatcgggga  1140
agacaatctc aacaagaaga tgagaaggtc catcgaggag ctgagcacgg gcatagtgaa  1200
caagctcctt cacggcccac tgcagcacct gagatgcgac ggcagcagaa gccgcaccct  1260
ggacgaaacg cttgagaaca tgcacgccct caacagatg ttcaacctcg acacggagaa  1320
ggcggtcctt gagcagaaga tcaaggccaa ggtagagaag acccaaagct gagaccagga  1380
gacacttgcc cgtctgtata tctacttata ctgctcccag aatgtcgcta cattctaatc  1440
ccaatatttt tctttggat cctccaaaaa aaaaaaaaa                          1480


<210> 20
<211> 454
<212> PRT
<213> Triticum aestivum

<400> 20
Glu Lys Ser Ser Ile Ala Val Ile Gly Leu Ser Val His Thr Ala Pro
 1               5                   10                  15

Val Asp Met Arg Glu Lys Leu Ala Val Ala Glu Glu Leu Trp Pro Arg
                20                  25                  30

Ala Ile Ser Glu Leu Thr Ser Leu Asn His Ile Glu Glu Ala Ala Val
            35                  40                  45

Leu Ser Thr Cys Asn Arg Met Glu Ile Tyr Val Val Ala Leu Ser Trp
    50                  55                  60

Asn Arg Gly Ile Arg Glu Val Val Asp Trp Met Ser Lys Lys Ser Gly
65                  70                  75                  80

Ile Pro Ala Ser Glu Leu Arg Glu His Leu Phe Met Leu Arg Asp Ser
                85                  90                  95

Asp Ala Thr Arg His Leu Phe Glu Val Ser Ala Gly Leu Asp Ser Leu
            100                 105                 110
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Val Leu Gly Glu Gly Gln Ile Leu Ala Gln Val Lys Gln Val Val Arg
        115                 120                 125
Asn Gly Gln Asn Ser Gly Gly Leu Gly Lys Asn Ile Asp Arg Met Phe
        130                 135                 140
Lys Asp Ala Ile Thr Ala Gly Lys Arg Val Arg Cys Glu Thr Asn Ile
145                 150                 155                 160
Ser Ala Gly Ala Val Ser Val Ser Ser Ala Ala Val Glu Leu Ala Met
                165                 170                 175
Met Lys Leu Pro Lys Ser Glu Cys Leu Ser Ala Arg Met Leu Leu Ile
            180                 185                 190
Gly Ala Gly Lys Met Gly Lys Leu Val Val Lys His Leu Ile Ala Lys
        195                 200                 205
Gly Cys Lys Lys Val Val Val Ala Asn Arg Ser Val Glu Arg Val Asp
    210                 215                 220
Ala Ile Arg Gln Glu Met Lys Asp Ile Glu Ile Val Tyr Arg Pro Leu
225                 230                 235                 240
Thr Glu Met Tyr Glu Ala Ala Ala Glu Ala Asp Val Val Phe Thr Ser
                245                 250                 255
Thr Ala Ser Glu Ser Leu Leu Phe Thr Lys Glu His Ala Glu Ala Leu
            260                 265                 270
Pro Pro Ile Ser Leu Ala Val Gly Gly Val Arg Leu Phe Val Asp Ile
        275                 280                 285
Ser Val Pro Arg Asn Val Gly Ala Cys Val Ser Glu Val Glu His Ala
    290                 295                 300
Arg Val Tyr Asn Val Asp Asp Leu Lys Glu Val Val Glu Ala Asn Lys
305                 310                 315                 320
Glu Asp Arg Val Arg Lys Ala Met Glu Ala Gln Thr Ile Ile Thr Gln
                325                 330                 335
Glu Leu Lys Arg Phe Glu Ala Trp Arg Asp Ser Leu Glu Thr Val Pro
            340                 345                 350
Thr Ile Lys Lys Leu Arg Ser Tyr Ala Asp Arg Ile Arg Ala Ser Glu
        355                 360                 365
Leu Glu Lys Cys Leu Gln Lys Ile Gly Glu Asp Asn Leu Asn Lys Lys
    370                 375                 380
Met Arg Arg Ser Ile Glu Glu Leu Ser Thr Gly Ile Val Asn Lys Leu
385                 390                 395                 400
Leu His Gly Pro Leu Gln His Leu Arg Cys Asp Gly Ser Asp Ser Arg
                405                 410                 415
Thr Leu Asp Glu Thr Leu Glu Asn Met His Ala Leu Asn Arg Met Phe
            420                 425                 430
Asn Leu Asp Thr Glu Lys Ala Val Leu Glu Gln Lys Ile Lys Ala Lys
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                435              440              445
      Val Glu Lys Thr Gln Ser
          450


      <210> 21
      <211> 846
      <212> DNA
      <213> Zea mays

      <400> 21
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      tgctccacct ccgacatcgc gcgagacgag caagcccaag tatggccgga gcagcagcag  120
      ccgccgccgt ggcgtccggg gtctcggccc ggccggccgc gccgaggagg gcttctgcgg  180
      gacgccgcgc tcggctgtcg gtggtgcggg ccgcgatatc cctcgagaag ggcaggaagg  240
      cgtacacggt gcagaagtcc gaggagatct tcaacgccgc caaggagctg atgcctggag  300
      gtgttaattc gccggtccgt gccttcaaat ctgttggtgg gcagccagta gtgttcgact  360
      ctgtaaaggg ttctcgtatg tgggatgttg atgggaatga gtacattgat tacgttggtt  420
      cctggggtcc tgcaatcatc ggccatgcag atgataaggt taatgctgca ttgattgaaa  480
      ctctgaagaa aggaactagc tttggtgctc catgtttgct ggagaacgta ttggctgaga  540
      tggtcatctc tgccgtgcca agtatcgaaa tggtccgctt tgtcaactca gggacagaag  600
      cctgcatggg agcgctccgc ctcgtgcgcg cattcaccgg gcgggagaag atcatcaagt  660
      tcgaaggctg ctaccatggc catgccgatt ccttccttgt caaagctggc agtggtgtcg  720
      ccaccccttgg cctcccagac tcccctggcg tccccaaggg ggccacctac gagactctaa  780
      cggcacccta caatgatgtc gaggcagtga agaaactgtt cgaggacaac gcggggggaga  840
      ttgctg                                                             846


      <210> 22
      <211> 248
      <212> PRT
      <213> Zea mays

      <400> 22
      Met Ala Gly Ala Ala Ala Ala Ala Ala Val Ala Ser Gly Val Ser Ala
        1               5                  10                  15

      Arg Pro Ala Ala Pro Arg Arg Ala Ser Ala Gly Arg Arg Ala Arg Leu
                 20                  25                  30

      Ser Val Val Arg Ala Ala Ile Ser Leu Glu Lys Gly Glu Lys Ala Tyr
              35                  40                  45

      Thr Val Gln Lys Ser Glu Glu Ile Phe Asn Ala Ala Lys Glu Leu Met
          50                  55                  60

      Pro Gly Gly Val Asn Ser Pro Val Arg Ala Phe Lys Ser Val Gly Gly
       65                  70                  75                  80

      Gln Pro Val Val Phe Asp Ser Val Lys Gly Ser Arg Met Trp Asp Val
                      85                  90                  95

      Asp Gly Asn Glu Tyr Ile Asp Tyr Val Gly Ser Trp Gly Pro Ala Ile
                     100                 105                 110

      Ile Gly His Ala Asp Asp Lys Val Asn Ala Ala Leu Ile Glu Thr Leu
                 115                 120                 125

      Lys Lys Gly Thr Ser Phe Gly Ala Pro Cys Leu Leu Glu Asn Val Leu
                 130                 135                 140
```

```
Ala Glu Met Val Ile Ser Ala Val Pro Ser Ile Glu Met Val Arg Phe
145                 150                 155                 160

Val Asn Ser Gly Thr Glu Ala Cys Met Gly Ala Leu Arg Leu Val Arg
            165                 170                 175

Ala Phe Thr Gly Arg Glu Lys Ile Ile Lys Phe Glu Gly Cys Tyr His
            180                 185                 190

Gly His Ala Asp Ser Phe Leu Val Lys Ala Gly Ser Gly Val Ala Thr
        195                 200                 205

Leu Gly Leu Pro Asp Ser Pro Gly Val Pro Lys Gly Ala Thr Tyr Glu
    210                 215                 220

Thr Leu Thr Ala Pro Tyr Asn Asp Val Glu Ala Val Lys Lys Leu Phe
225                 230                 235                 240

Glu Asp Asn Ala Gly Glu Ile Ala
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<210> 23
<211> 461
<212> DNA
<213> Oryza sativa

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<222> (453)
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cttacaaaag catggccgga gcagcagccg cctccgccgc cgccgccgcc gtggcgtccg   60
ggatctcggc ccggccggtg gccccgaggc cctctccctc gcgcgcgcgc gccccacggt  120
ccgtcgtgcg ggcggncatc tccgtcgaga aggggggagaa ggcgtacacg gtggagaagt  180
ccgaggagat cttcaacgcc gccaaggagt tgatgcctgn gggtgttaat tcaccagttc  240
gtgccttcaa atcagttggt gggcanccca ttgtgtttga ttctgtgaag ggtctcgtat  300
gtgggatgtg gatggaaatg aatatatcga ttagttgggg ntcctgangg tcntgngatn  360
atcgggtcat gcagatgata cngtnaatgc agcatnattg aacncaaaan aaaganctnc  420
tttgggcccc atgntatggc atgtttggtt nanaggtaac t                      461
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<210> 24
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<212> PRT
<213> Oryza sativa

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<223> Xaa = ANY AMINO ACID

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Ala Ala Ala Val Ala Ser Gly Ile Ser Ala Arg Pro Val Ala Pro Arg
  1               5                  10                  15

Pro Ser Pro Ser Arg Ala Arg Ala Pro Arg Ser Val Val Arg Ala Xaa
             20                  25                  30

Ile Ser Val Glu Lys Gly Glu Lys Ala Tyr Thr Val Glu Lys Ser Glu
         35                  40                  45

Glu Ile Phe Asn Ala Ala Lys Glu Leu Met Pro Xaa Gly Val Asn Ser
     50                  55                  60

Pro Val Arg Ala Phe Lys Ser Val Gly Gly Xaa Pro Ile Val Phe Xaa
 65                  70                  75                  80

Phe Cys Glu Gly Ser Arg Met Trp Asp Val Asp Gly Asn Glu Tyr Ile
                 85                  90                  95
```

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                Asp Xaa Val Gly
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                <210> 25
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                <212> DNA
                <213> Oryza sativa

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                gcgtccggga tctcggcccg gccggtggca ccgaggccct ctccctgcg cgccgcgcc    120
                ccacggtccg tcgtgcgggc ggccatctcc gtcgagaagg gggagaaggc gtacacggtg    180
                gagaagtccg aggagatctt caacgccgcc aaggagttga tgcctggggg tgttaattca    240
                ccagttcgtg ccttcaaatc agttggtggg cagcccattg tgtttgattc tgtgaagggt    300
                tctcgtatgt gggatgtgga tggaaatgaa tatatcgatt atgttggttc ctggggtcat    360
                gcgatcatcg gtcatgcaga tgatacggtg aatgcagcat tgattgaaac tctaaagaaa    420
                ggaactagct ttggcgctcc atgtgtgttg gagaatgtgt tggctgagat ggtcatctct    480
                gctgtaccaa gtatcgaaat ggtccgtttt gtcaattcag ggacagaagc ctgcatggga    540
                gcgctgcgcc ttgtgcgtgc attcactggg agagagaaga ttctcaagtt tgaaggttgt    600
                taccatggcc atgcagattc cttccttgtt aaagctggca gtggtgttgc caccccttggc    660
                ctcccagact cccctggagt ccccaaggga gccacatctg agactctaac ggcaccatac    720
                aatgatgtcg aggcagtgaa aaaactgttt gaggagaaca aagggcagat tgctgctgtc    780
                ttccttgagc ccgttgttgg caatgctggc ttcattcctc cacagcccgg ttttctgaat    840
                gctctccgtg acttgacgaa acaagacggt gcacttttgg tctttgatga agtgatgacg    900
                ggtttccgtt tagcttatgg tggggctcaa gaatacttcg ggatcaccc tgatgtgtca    960
                acattgggaa aatcatcggt cggtcttcca gttggcgctt atggtggacg taaggacatc    1020
                atggagatgg ttgctccagc agggccaatg taccaggcag gaaccctcag tggaaaccct    1080
                ctagctatga ctgctggaat ccacacactc aagcgtctga tggagcctgg aacctacgat    1140
                tacttggaca agatcactgg tgatcttgtt cgcggggtat tggacgcggg tgcgaaaact    1200
                ggacatgaga tgtgtggagg acacatcagg gggatgttcg ggttcttctt caccgctggc    1260
                ccagttcaca actttggtga cgcgaagaag agtgacaccg ccaagtttgg gaggttctac    1320
                cggggcatgc ttgaagaagg tgtgtaccta gctccatccc agtttgaggc aggtttcacc    1380
                agcttggcac acacctccca ggacatcgaa aaaaccgtgg aggcagctgc gaaagttctt    1440
                cgccggatat agagtcttcg acagttgagc ttagctacgg cttgtgaatc acttgctatt    1500
                tttcatttgt gttgtacact gttagttcta catcactcaa aatctgtatt gtgcagcagc    1560
                ggtacatttc ctctagcccc catatcattg tgagttagta gcatccatgg tgtttttgca    1620
                gtgccaataa agttattttt gat                                            1643


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                <213> Oryza sativa

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                  1               5                  10                  15

                Gly Ile Ser Ala Arg Pro Val Ala Pro Arg Pro Ser Pro Ser Arg Ala
                             20                  25                  30

                Arg Ala Pro Arg Ser Val Val Arg Ala Ala Ile Ser Val Glu Lys Gly
                         35                  40                  45

                Glu Lys Ala Tyr Thr Val Glu Lys Ser Glu Glu Ile Phe Asn Ala Ala
```

```
              50                  55                      60
Lys Glu Leu Met Pro Gly Gly Val Asn Ser Pro Val Arg Ala Phe Lys
 65                  70                  75                      80

Ser Val Gly Gly Gln Pro Ile Val Phe Asp Ser Val Lys Gly Ser Arg
                 85                  90                      95

Met Trp Asp Val Asp Gly Asn Glu Tyr Ile Asp Tyr Val Gly Ser Trp
                100                 105                 110

Gly Pro Ala Ile Ile Gly His Ala Asp Asp Thr Val Asn Ala Ala Leu
            115                 120                 125

Ile Glu Thr Leu Lys Lys Gly Thr Ser Phe Gly Ala Pro Cys Val Leu
        130                 135                 140

Glu Asn Val Leu Ala Glu Met Val Ile Ser Ala Val Pro Ser Ile Glu
145                 150                 155                     160

Met Val Arg Phe Val Asn Ser Gly Thr Glu Ala Cys Met Gly Ala Leu
                165                 170                 175

Arg Leu Val Arg Ala Phe Thr Gly Arg Glu Lys Ile Leu Lys Phe Glu
            180                 185                 190

Gly Cys Tyr His Gly His Ala Asp Ser Phe Leu Val Lys Ala Gly Ser
        195                 200                 205

Gly Val Ala Thr Leu Gly Leu Pro Asp Ser Pro Gly Val Pro Lys Gly
        210                 215                 220

Ala Thr Ser Glu Thr Leu Thr Ala Pro Tyr Asn Asp Val Glu Ala Val
225                 230                 235                     240

Lys Lys Leu Phe Glu Asn Lys Gly Gln Ile Ala Ala Val Phe Leu
                245                 250                 255

Glu Pro Val Val Gly Asn Ala Gly Phe Ile Pro Pro Gln Pro Gly Phe
            260                 265                 270

Leu Asn Ala Leu Arg Asp Leu Thr Lys Gln Asp Gly Ala Leu Leu Val
        275                 280                 285

Phe Asp Glu Val Met Thr Gly Phe Arg Leu Ala Tyr Gly Gly Ala Gln
    290                 295                 300

Glu Tyr Phe Gly Ile Thr Pro Asp Val Ser Thr Leu Gly Lys Ile Ile
305                 310                 315                     320

Gly Xaa Gly Leu Pro Val Gly Ala Tyr Gly Gly Arg Lys Asp Ile Met
                325                 330                 335

Glu Met Val Ala Pro Ala Gly Pro Met Tyr Gln Ala Gly Thr Leu Ser
            340                 345                 350

Gly Asn Pro Leu Ala Met Thr Ala Gly Ile His Thr Leu Lys Arg Leu
        355                 360                 365

Met Glu Pro Gly Thr Tyr Asp Tyr Leu Asp Lys Ile Thr Gly Asp Leu
    370                 375                 380
```

```
Val Arg Gly Val Leu Asp Ala Gly Ala Lys Thr Gly His Glu Met Cys
385                 390                 395                 400

Gly Gly His Ile Arg Gly Met Phe Gly Phe Phe Thr Ala Gly Pro
                405                 410                 415

Val His Asn Phe Gly Asp Ala Lys Lys Ser Asp Thr Ala Lys Phe Gly
            420                 425                 430

Arg Phe Tyr Arg Gly Met Leu Glu Glu Gly Val Tyr Leu Ala Pro Ser
        435                 440                 445

Gln Phe Glu Ala Gly Phe Thr Ser Leu Ala His Thr Ser Gln Asp Ile
    450                 455                 460

Glu Lys Thr Val Glu Ala Ala Ala Lys Val Leu Arg Arg Ile
465                 470                 475
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<210> 27
<211> 650
<212> DNA
<213> Triticum aestivum

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ctccggcatc tcgatccgga cggtcgccgc tcctaagatc tcgcgcgcgc ctcgctctcg 180
gtcggtggtg aagggcggcc gtttccttag gcgagaaggc ttacacggtt caagaaatct 240
gaggagattt tcaacgctgc caaaggaatt tgatgcctgg aggtgttaat tcaaccaatc 300
cgtgccttca aaatcaatcc nggcgggaac ccanaatttt tgattccgtn aaaggntctc 360
anatgtngga ttccnatgga aatgaataat tgataagttn gntcctgggg cctgcancat 420
tggtcacgca aattacaang tgaagctgca ttattgaaan ccgnaanaag gaacnacttt 480
gggccaagtn cttgggaang ttttggnaaa atggcaactc gctgtccnan tacaaanggt 540
cctttgtaaa tcaagacaaa actgatggga gaatcgcctt ttcgtcatta ctggaaggaa 600
anntccaant taagggttca tgcangaaat ccttcnctta aaagaagggn   650

<210> 28
<211> 67
<212> PRT
<213> Triticum aestivum

<400> 28
Met Ala Gly Ala Ala Ala Ala Ala Ala Ala Val Ala Ser Gly Ile Ser
 1   5   10   15

Ile Arg Thr Val Ala Ala Pro Lys Ile Ser Arg Ala Pro Arg Ser Arg
            20   25   30

Ser Val Val Lys Gly Gly Arg Phe Leu Arg Arg Glu Gly Leu His Gly
            35   40   45

```
Ser Arg Asn Leu Arg Arg Phe Ser Thr Leu Pro Lys Glu Phe Asp Ala
    50                  55                  60

Trp Arg Cys
 65


<210> 29
<211> 542
<212> PRT
<213> soybean

<400> 29
Met Ala Val Ser Thr Ser Phe Pro Gly Ala Lys Leu Glu Ala Leu Leu
 1               5                  10                  15

Leu Lys Cys Gly Ser Ser Asn Ala Ala Thr Ala Thr Ala Thr Thr Thr
            20                  25                  30

Thr His Leu Ser Cys Phe Cys Lys Thr Arg Lys Thr Leu Val Gln Ser
        35                  40                  45

Gln Arg Gly Pro Ile Arg Cys Glu Ala Ser Ser Ala Ser Asp Val Val
    50                  55                  60

Ala Asp Ala Thr Lys Lys Ala Ala Ser Val Ser Ala Leu Glu Gln Leu
 65                  70                  75                  80

Lys Thr Ser Ala Ala Asp Arg Tyr Thr Lys Glu Arg Ser Ser Val Met
                85                  90                  95

Val Ile Gly Leu Ser Val His Ser Thr Pro Val Glu Met Arg Glu Lys
            100                 105                 110

Leu Ala Ile Pro Glu Ala Glu Trp Pro Arg Ala Ile Ala Glu Leu Cys
        115                 120                 125

Ser Leu Asn His Ile Glu Glu Ala Ala Val Leu Ser Thr Cys Asn Arg
    130                 135                 140

Met Glu Ile Tyr Val Val Ala Leu Ser Lys His Arg Gly Val Lys Glu
145                 150                 155                 160

Val Thr Glu Trp Met Ser Lys Thr Ser Gly Ile Pro Val Ala Asp Leu
                165                 170                 175

Cys Gln His Gln Phe Leu Leu Tyr Asn Lys Asp Ala Thr Gln His Leu
            180                 185                 190

Phe Glu Val Ser Ala Gly Leu Asp Ser Leu Val Leu Gly Glu Gly Gln
        195                 200                 205

Ile Leu Ala Gln Val Lys Gln Val Val Lys Val Gly Gln Gly Val Asn
    210                 215                 220

Gly Phe Gly Arg Asn Ile Ser Gly Leu Phe Lys His Ala Ile Thr Val
225                 230                 235                 240

Gly Lys Arg Val Arg Thr Glu Thr Asn Ile Ala Ala Gly Ala Val Ser
                245                 250                 255
```

```
Val Ser Ser Ala Ala Val Glu Leu Ala Leu Met Lys Leu Pro Glu Ala
          260                     265                 270

Ser His Ala Asn Ala Arg Met Leu Val Ile Gly Ala Gly Lys Met Gly
          275                 280                 285

Lys Leu Val Ile Lys His Leu Val Ala Lys Gly Cys Thr Lys Met Val
          290                 295                 300

Val Val Asn Arg Ser Glu Arg Val Ala Ala Ile Arg Glu Glu Ile
305                 310                 315                 320

Lys Asp Val Glu Ile Ile Tyr Lys Pro Leu Ser Glu Met Leu Thr Cys
              325                 330                 335

Ile Gly Glu Ala Asp Val Val Phe Thr Ser Thr Ala Ser Glu Asn Pro
              340                 345                 350

Leu Phe Leu Lys Asp Asp Val Lys Glu Leu Pro Pro Ala Thr Asp Glu
          355                 360                 365

Val Gly Gly Arg Arg Leu Phe Val Asp Ile Ser Val Pro Arg Asn Val
          370                 375                 380

Gly Ser Cys Leu Ser Asp Leu Glu Ser Val Arg Val Tyr Asn Val Asp
385                 390                 395                 400

Asp Leu Lys Glu Val Val Ala Ala Asn Lys Glu Asp Arg Leu Arg Lys
              405                 410                 415

Ala Met Glu Ala Gln Ala Ile Ile Gly Glu Glu Ser Lys Gln Phe Glu
          420                 425                 430

Ala Trp Arg Asp Ser Leu Glu Thr Val Pro Thr Ile Lys Lys Leu Arg
          435                 440                 445

Ala Tyr Ala Glu Arg Ile Arg Leu Ala Glu Leu Glu Lys Cys Leu Gly
          450                 455                 460

Lys Met Gly Asp Asp Ile Asn Lys Lys Thr Gln Arg Ala Val Asp Asp
465                 470                 475                 480

Leu Ser Arg Gly Ile Val Asn Lys Leu Leu His Gly Pro Met Gln His
              485                 490                 495

Leu Arg Cys Asp Gly Ser Asp Ser Arg Thr Leu Ser Glu Thr Leu Glu
          500                 505                 510

Asn Met His Ala Leu Asn Arg Met Phe Asn Leu Glu Thr Glu Ile Ser
          515                 520                 525

Val Leu Glu Gln Lys Ile Arg Ala Lys Val Glu Gln Lys Pro
          530                 535                 540
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<210> 30
<211> 469
<212> PRT
<213> [Hordeum vulgare]

<400> 30

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Met Ala Gly Ala Ala Ala Ala Val Ala Ser Gly Ile Ser Ile Arg Pro
 1               5                   10                      15

Val Ala Ala Pro Lys Ile Ser Arg Ala Pro Arg Ser Arg Ser Val Val
            20                  25                  30

Arg Ala Ala Val Ser Ile Asp Glu Lys Ala Tyr Thr Val Gln Lys Ser
        35                  40                  45

Glu Glu Ile Phe Asn Ala Ala Lys Glu Leu Met Pro Gly Gly Val Asn
    50                  55                  60

Ser Pro Val Arg Ala Phe Lys Ser Val Gly Gly Gln Pro Ile Val Phe
65                  70                  75                      80

Asp Ser Val Lys Gly Ser His Met Trp Asp Val Asp Gly Asn Glu Tyr
            85                  90                  95

Ile Asp Tyr Val Gly Ser Trp Gly Pro Ala Ile Ile Gly His Ala Asp
            100                 105                 110

Asp Lys Val Asn Ala Ala Leu Ile Glu Thr Leu Lys Lys Gly Thr Ser
    115                 120                 125

Phe Gly Ala Pro Cys Ala Leu Glu Asn Val Leu Ala Gln Met Val Ile
    130                 135                 140

Ser Ala Val Pro Ser Ile Glu Met Val Arg Phe Val Asn Ser Gly Thr
145                 150                 155                 160

Glu Ala Cys Met Gly Ala Leu Arg Leu Val Arg Ala Phe Thr Gly Arg
            165                 170                 175

Glu Lys Ile Leu Lys Phe Glu Gly Cys Tyr His Gly His Ala Asp Ser
            180                 185                 190

Phe Leu Val Lys Ala Gly Ser Gly Val Ala Thr Leu Gly Leu Pro Asp
    195                 200                 205

Ser Pro Gly Val Pro Lys Gly Ala Thr Val Gly Thr Leu Thr Ala Pro
    210                 215                 220

Tyr Asn Asp Ala Asp Ala Val Lys Lys Leu Phe Glu Asp Asn Lys Gly
225                 230                 235                 240

Glu Ile Ala Ala Val Phe Leu Glu Pro Val Val Gly Asn Ala Gly Phe
            245                 250                 255

Ile Pro Pro Gln Pro Ala Phe Leu Asn Ala Leu Arg Glu Val Thr Lys
            260                 265                 270

Gln Asp Gly Ala Leu Leu Val Phe Asp Glu Val Met Thr Gly Phe Arg
    275                 280                 285

Leu Ala Tyr Gly Gly Ala Gln Glu Tyr Phe Gly Ile Thr Pro Asp Val
    290                 295                 300

Thr Thr Leu Gly Lys Ile Ile Gly Gly Gly Leu Pro Val Gly Ala Tyr
305                 310                 315                 320
```

```
Gly Gly Arg Lys Asp Ile Met Glu Met Val Ala Pro Ala Gly Pro Met
            325                 330                 335

Tyr Gln Ala Gly Thr Leu Ser Gly Asn Pro Leu Ala Met Thr Ala Gly
            340                 345                 350

Ile His Thr Leu Lys Arg Leu Met Glu Pro Gly Thr Tyr Glu Tyr Leu
            355                 360                 365

Asp Lys Val Thr Gly Glu Leu Val Arg Gly Ile Leu Asp Val Gly Ala
    370                 375                 380

Lys Thr Gly His Glu Met Cys Gly Gly His Ile Arg Gly Met Phe Gly
385                 390                 395                 400

Phe Phe Phe Ala Gly Gly Pro Val His Asn Phe Asp Asp Ala Lys Lys
            405                 410                 415

Ser Asp Thr Ala Lys Phe Gly Arg Phe His Arg Gly Met Leu Gly Glu
            420                 425                 430

Gly Val Tyr Leu Ala Pro Ser Gln Phe Glu Ala Gly Phe Thr Ser Leu
            435                 440                 445

Ala His Thr Thr Gln Asp Ile Glu Lys Thr Val Glu Ala Ala Glu Lys
    450                 455                 460

Val Leu Arg Trp Ile
465
```